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ABSTRACT

The purpose of this study was to determine (1) whether beginning typewriting on the community college level should be taught in a five-day-a-week pattern or in a reduced three-day-a-week pattern; (2) what, if any, relationship existed between the achievement level in beginning college typewriting and the following student characteristics: Locus of control, cloze reading comprehension, tapping aptitude, previous typing instruction, age, and typewriter ownership; and (3) if any relationship existed between student achievement level in beginning college typewriting and student characteristics, and was it the same for those students experiencing three class hours of directed instruction weekly as for those students experiencing five class hours of directed instruction weekly. The experiment consisted of a pretest-posttest control group design with 40 community college students randomly assigned into two sections of beginning typewriting. Analyses of covariance and multiple regression analyses were used to test the hypotheses. Findings showed that (1) beginning college typewriting classes meeting five class hours a week did not achieve significantly better than classes meeting three class hours a week on achievement measures of gross words per minute on straight copy; errors per minute, on straight copy; and production points score on a manuscript, a tabulation, and a letter; (2) no significant relationship existed between the achievement level in beginning college typewriting and any of the student characteristics measured; (3) there was a significant relationship, although a marginal one, between student achievement level in beginning college typewriting and student characteristics for those students experiencing three class hours of directed instruction weekly. (LAS)

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FINAL REPORT

A STUDY COMPARING TYPEWRITING ACHIEVEMENT OF STUDENTS ATTENDING CLASS THREE AND FIVE DAYS A WEEK IN BEGINNING TYPEWRITING AT THE COMMUNITY COLLEGE LEVEL

(Project No. 19-6012)

Adelle W. Ziemer, Ed.D.

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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LEHIGH COUNTY COMMUNITY COLLEGE

SCHNECKSVILLE, PENNSYLVANIA

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Introductory Section

Five days a week in the college typewriting classroom is what teachers and students have traditionally come to expect. While many instructors in other fields meet class two or three days a week, most beginning typewriting teachers meet classes on a daily basis. Questioning this traditional pattern of teaching arises because three credit hours (not five) are usually granted for five class hours of beginning typewriting work. It is therefore only natural to wonder if students can achieve expected results in beginning typewriting by meeting three days a week instead of five.

Admittedly, more research had to be done than just testing three- versus five-day-a-week patterns. Other variables certainly entered the picture. What made this study unique was the variety of student characteristic variables that were considered in order to attempt to locate significant criteria for ultimately making such a decision.

The purpose of this study was to determine (1) whether beginning typewriting on the community college level should be taught in a five-day-a-week pattern or in a reduced three-day-a-week pattern; (2) what, if any, relationship existed between the achievement level in beginning college typewriting and the following student characteristics: locus of control, cloze reading comprehension, tapping aptitude, previous typing instruction, age, and typewriter ownership; and (3) if any relationship existed between student achievement level in beginning college typewriting and student characteristics, was it the same for

those students experiencing three class hours of directed instruction weekly as well as for those students experiencing five class hours of directed instruction weekly.

The experiment consisted of a pretest-posttest control group design. Forty community college students at one institution who wished to enroll for typewriting but who did not qualify for advanced placement via a qualifying test were randomly assigned into two sections of beginning typewriting. Randomization took place during registration as follows: when students requested beginning typewriting, they were assigned either to section one or section two, beginning with the first student who registered and alternating thereafter.

Both section one and section two were scheduled to meet for five 50-minute class periods a week in adjacent time segments. The same instructor taught both groups, using identical instructional materials, the same classroom, and the same equipment. Teaching was done in the usual manner without trying to vary between the control and the experimental groups. Faculty peers, upon the request of the researcher, made unannounced observations in both classes to comment on carrying out this objective. Observed factors included manner, approach, audio-visuals, voice, enthusiasm, questioning, organization, and attitude. From time to time, identical lessons were presented via professionally-prepared, purchased, taped instruction.

After the introduction of the alphabetic letter keys (lessons 1-12 and during the third week), two days were needed to administer these tests. The first test was The National Business Education Association Typewriting I--First Semester, Number One Test, which consisted of two five-minute timed writings, a rough draft, a centering problem, and a business letter--all of which required keyboard use. In the second

day, pen or pencil handwritten responses were obtained from each pupil for the Rotter Internal-External Control Scale (I-E), a cloze reading test, and a student questionnaire. Each one of these vehicles for gathering information was previously validated in other environments. (Students who were absent on the day of testing were given the test on an individual basis via a taped recording of the testing day itself.)

When the initial testing series were completed, the instructor flipped a coin to determine which section would meet for three days a week (experimental) and which section would meet five days a week (control). Thereafter, the control group met at a regularly scheduled time (1 p.m.) for 50 minutes five times a week for a period of 12 weeks for a total of 60 additional directed-instruction lessons, whereas the experimental group met at a regularly scheduled time (2 p.m.) for 50 minutes three times a week for a period of 12 weeks for a total of 36 additional directed-instruction lessons.

Homework assignments were made on Mondays and Wednesdays in both groups. A typical assignment consisted of one lesson from the textbook made up usually of a warm-up exercise, special drills, and a practice problem. During the early assignment weeks, the homework tasks were given orally; however, later assignments consisted of competency-based written tasks.

The control group completed the homework assignment during the regularly scheduled class meeting periods on Tuesdays and Thursdays, with the instructor present. When there was leftover time, additional teacher-supervised drill took place. The experimental group completed the same homework assignment as the control group but typed the assignment at the hour and place of their choosing. When a student in the experimental group had a question, the instructor was available during the two released

class periods as well as during five regular office hours since no lab assistant was available.

Each student in both the groups had immediate feedback on the homework assignment via a proofguide (miniature answer keys), was required to turn in his typed homework assignment on a daily basis, and recorded as well as turned in his outside-of-class practice time report on a weekly basis. The typed homework assignments were submitted to the instructor; however, to insure pre-grade confidentiality, the practice time report was submitted to a student volunteer in each class. Each student in both groups was encouraged to practice typewriting outside of class and was issued one-, two-, three-, and five-minute timings on recorded tape cassettes for the duration of the semester, should he wish to time any practice work. (Cassette players were available in the library and could be checked out on the same basis as books.) Each student in both groups was notified when typewriting rooms on campus were open for outside-of-class practice.

During the final full week of instruction, one day was used to re-administer the pretest, that being the National Business Education Association I--First Semester, Number One Test, which then became the post-test. Scrupulous care, precision in timing the work, and written out sentence "speeches" were used to replicate the pretest administration in the post-test administration. (Students who were absent on the day of the testing were given the test on an individual basis via a taped recording of the testing day itself.)

The pretest and the post-test in typewriting were graded by the experimenter and rechecked by an experienced typewriting teacher as well as by a clerical assistant, whereas all other instruments were scored by the experimenter and rechecked by a clerical assistant.

The initial inspection of the data led the researcher to the inclusion of an additional input variable: the pretest itself. Perhaps the first measure of typewriting ability might predict future typewriting performance. Moreover, typewriting teachers clearly understand typing tests whereas they are generally not too familiar with tests which determine locus of control, cloze reading comprehension, and tapping aptitude.

Two statistical techniques were used to test the hypothesis. Analysis of covariance was used to compare the three-day-a-week instruction with the five-day-a-week instruction, whereas regression analysis was used to measure the relationship of student characteristics to typewriting achievement and to assess this measured relationship in terms of the frequency of directed instruction. (Multiple regression analysis was performed with achievement as the dependent variable and six independent variables during the first run. During the second run, seven independent variables were analyzed: six of the original ones plus one additional variable, i.e. the pretest itself.) The CDC 6400 computer at Temple University was used to process the data. The level of significance for this study was .05 or below.

Findings and Analysis

An analysis of the data secured in this study revealed the following three findings:

1. Beginning college typewriting classes meeting five class hours a week did not achieve significantly better than classes meeting three class hours a week on the following measures of achievement: gross words per minute (GWPM) on straight copy; errors per minute (EPM) on straight copy; and production points scored (PROD) on a manuscript, a tabulation, and a letter.

Finding number one hinged on out-of-class assignments being given in lieu of in-class meetings. Most of the students in this study did record the amount of time they spent on out-of-class typewriting; however, records were not complete for every student. From the reports that were completed, the findings indicated that the mean time spent on out-of-class typewriting was 65 minutes a week for the control group and 131 minutes a week for the experimental group. When the additional two 50-minute class periods were added to the control group typewriting time, the control group practiced 165 minutes a week compared to 131 minutes a week for the experimental group. In spite of this nearly half-hour per week of time difference, the control group did not achieve significantly better than the experimental group with respect to GWPM, EPM, and PROD achievement.

2. No significant relationship existed between the achievement level (measured in terms of GWPM, EPM, and PROD) in beginning college typewriting and the following student characteristics: locus of control, cloze reading comprehension, tapping aptitude, previous typing instruction, age, and typewriter ownership.

However, there was a significant relationship between the achievement level (measured in terms of GWPM and PROD, omitting EPM) and one of the independent variables--previous typewriting instruction. Moreover, administration of a pretest immediately following the presentation of the alphabetic keyboard was the most significant predictor of achievement in beginning college typewriting when achievement was measured in terms of GWPM and PROD, omitting EPM.

None of the following independent variables proved significantly able to predict EPM achievement on straight copy: EPM pretest scores, locus of control, cloze reading comprehension, tapping aptitude, previous typewriting instruction, age, and typewriter ownership.

3. There was a significant relationship, although a marginal one, between student achievement level (measured in terms of only GWPM) in beginning college typewriting and student characteristics (without the GWPM pretest) for those students experiencing three class hours of directed instruction weekly. On the other hand, there was no significant relationship between student achievement level (measured in terms of only GWPM) in beginning college typewriting and student characteristics (without the GWPM pretest) for those students experiencing five class hours of directed instruction weekly. Thus, the relationship (based on the reduced sample sizes in the two individual groups) between the GWPM achievement level in beginning college typewriting and student characteristics (locus of control, cloze reading comprehension, tapping aptitude, previous typewriting instruction, age, and typewriter ownership) for students experiencing three class hours of directed instruction weekly was different from the relationship for students experiencing five class hours of directed instruction weekly.

When the GWPM pretest scores were added to the model, a significant relationship existed and it was the same for both groups, i.e. the relationship between the GWPM achievement level in beginning college typewriting and student characteristics (including the GWPM pretest) for students experiencing three class hours of directed instruction weekly was not different from the GWPM achievement level in beginning college typewriting and student characteristics (including the GWPM pretest) for students experiencing five class hours of directed instruction weekly.

Also, there was no significant relationship between student achievement level (measured in terms of EPM and PROD) in beginning college typewriting and student characteristics (with or without the EPM and PROD pretest scores) for those students experiencing three or five class hours of directed instruction weekly.

Conclusions and Recommendations

These conclusions resulted from the findings of the experiment:

1. Beginning college typewriting was taught as effectively with three hours a week in class and out-of-class assignments as with five hours a week in class and all assignments completed in class. This conclusion assumes that a teaching method similar to the one in this study be used whereby homework assignments are required in lieu of the two omitted classes and generous feedback concerning the accuracy of the assignments is available for immediate student reference.

2. The production achievement of students who typed assignments out of class did not differ from the production achievement of students who typed assignments in class.

3. The straight copy achievement of students who typed assignments out of class did not differ from the straight copy skills of students who typed assignments in class.

4. All beginning college typewriting students progressed regardless of the treatment or of their student characteristics.

5. A model utilizing student variables of locus of control, cloze reading comprehension, age, typewriter ownership, previous typewriting instruction, and tapping aptitude failed to predict achievement in beginning college typewriting. Achievement was measured in terms of gross words per minute (GWPM) on straight copy, errors per minute (EPM) on straight copy, and production points scored (PROD) on a manuscript, a tabulation and a letter.

6. Predicting GWPM and PROD achievement in beginning college typewriting was best achieved by means of a pretest administered immediately following the introduction of the alphabetic keyboard.

7. Predicting GWPM and PROD achievement in beginning college typewriting might also have been achieved by means of identifying those students who have had previous typewriting instruction.

8. None of the independent variables identified in this study (locus of control, cloze reading comprehension, age, typewriter ownership, previous typewriting instruction, tapping aptitude, and a pretest) was able to predict EPM achievement.

The recommendations for general implementation are:

1. All beginning college typewriting should be taught on a three-class-hours a week scheduling pattern rather than a five-class-hours a week basis.

2. Beginning college typewriting students should be given competency-based, written, out-of-class assignments to be completed on days when the class does not meet.

3. Out-of-class assignments should be accompanied by generous, immediate, visual feedback.

4. To identify low and/or high GWPM and PROD achievers in beginning college typewriting, administer a pretest after the introduction of the alphabetic keyboard.

The recommendations for further study are:

1. Conduct research to compare various meetings per week and some form of individual progression method.

2. Conduct research that would replicate this study.

3. Conduct research to reassess the reliability and validity of the National Business Education Association Typewriting I--First Semester, Number One Test for beginning college students.

The results of this study led to the following implications:

1. Beginning college typewriting students who are taught on a three-class-hours a week scheduling pattern should be required to complete the out-of-class assignments.

2. Aside from the required out-of-class assignments, students in beginning college typewriting should not be required to practice a specified number of hours a week.

3. Students in beginning college typewriting should be allowed to choose their own place and time for practice and for completing the out-of-class assignments.

4. Out-of-class assignments should be collected and reviewed by the instructor.

5. Authors of beginning college textbooks should consider structuring lesson materials so that alternate lessons can be given as out-of-class assignments.

6. If more than one section of beginning college typewriting is offered, separate the true beginner from those students who have had previous typewriting instruction.

7. If more than one typewriting room is equipped for typewriting instruction and more than one typewriting teacher is available, consider offering multiple sections of beginning college typewriting during the same time slot. This would make possible the separation of the true beginners from those students who have had previous typewriting instruction.

8. After the low GWPM and PROD achievers have been identified by way of a pretest administered after the introduction of the alphabetic keyboard, match them with appropriate performance goals and subcompetencies.

9. After the high GWPM and PROD achievers have been identified by way of a pretest administered after the introduction of the alphabetic keyboard, match them with appropriate performance goals and subcompetencies.

APPENDIX

A STUDY COMPARING TYPEWRITING ACHIEVEMENT OF STUDENTS ATTENDING CLASS THREE AND FIVE DAYS A WEEK IN BEGINNING TYPEWRITING AT THE COMMUNITY COLLEGE LEVEL

Submitted to the

Temple University Graduate Board

In Partial Fulfillment

of the Requirements for the Degree of

Doctor of Education

---

by

Adelle Yeakel Ziemer

May 1976

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To Dr. Adele F. Schrag, chairman of this committee, my heartfelt thanks. Her positive attitude, seemingly endless vitality, and probing comments have been a source of enrichment to me during the development of this study as well as in the classroom itself.

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Finally, I am especially grateful to my family: to my mother, Mrs. Claire E. Yeakel, for her supportive spirit and constant love which encourage me to fulfill ambitions in my life; to my husband, Dr. Richard C. Ziemer, for his devotion, patience, understanding, and professional as well as personal corroboration which permit me to be a liberated, yet bound wife; and to my daughter, Elleda Claire, who provided exciting and pleasant diversions from this study.

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CHAPTER I

THE PROBLEM

Introduction

The field of business prizes efficient use of time, labor, and material. Daily inventories and cost analyses, to mention two applications, furnish management with up-to-date data from which to make decisions and improve operations.

Where is the carry over from the field of business to the courses that are taught in business, particularly typewriting? Must time-honored patterns never be challenged, or can research such as this provide input for the everyday management of typewriting instruction and for the cost effectiveness of such an offering?

Five days a week in the college classroom is what teachers and students of typewriting have traditionally come to expect. While many instructors in other fields meet classes two or three days a week, most beginning typewriting teachers meet classes on a daily basis. Questioning this traditional pattern of teaching arises because three credit hours (not five) are usually granted for five class hours of beginning typewriting work. It is therefore only natural for a teacher to wonder if students can achieve expected results in beginning typewriting by meeting three days a week instead of five.

Admittedly, more research must be done than just testing three- versus five-day-a-week patterns. Other variables certainly enter the

picture. What makes this study unique is the variety of variables to be considered in order to locate significant criteria for ultimately making such a decision.

Statement of the Problem

The problem considered in the present study can be summarized as follows: Do college students in beginning typewriting who experience three class hours of directed instruction weekly achieve as well as those students who experience five class hours of directed instruction weekly in beginning typewriting at the same college, regardless of student characteristics?

This general question leads to considerations of three related questions:

1. Do college students experiencing three hours of directed instruction a week in beginning typewriting achieve as well as, better than, or less than college students experiencing five hours of directed instruction a week in beginning typewriting?

2. What predictive measures might be used to measure a student's achievement level in beginning college typewriting?

3. Do the same predictive measures work for assessing a student's achievement level in the three hours of directed instruction a week pattern as well as for the five hours of directed instruction a week pattern?

By providing empirical answers to these questions, this study should aid in determining: (1) whether beginning typewriting on the community college level should be taught in a five-day-a-week pattern or in a reduced three-day-a-week pattern; (2) which, if any, of the identified student characteristics might predict the achievement level in beginning college typewriting; and (3) whether or not these same predictive measures for assessing a student's achievement level may be used to prescribe the appropriate frequency pattern of instruction.

Null Hypotheses

Hypothesis No. 1: No significant difference exists between the achievement level of college students experiencing three class hours of directed instruction weekly in beginning typewriting and those students experiencing five class hours of directed instruction weekly in beginning typewriting at the same college.

Hypothesis No. 2: No significant relationship exists between the achievement level of beginning college typewriting and the following student characteristics:

2a. locus of control
2b. cloze reading comprehension
2c. tapping aptitude
2d. previous typewriting instruction
2e. college major
2f. age
2g. typewriter ownership
2h. sex

Hypothesis No. 3: The relationship between the achievement level in beginning college typewriting and student characteristics for students experiencing three class hours of directed instruction weekly is not different from the relationship for students experiencing five class hours of directed instruction weekly.

Need for the Study

The vast market for typewriting skill is amply supported by present and predicted employment figures for stenographers, typists, and secretaries; by enrollment in typewriting classes; and by domestic sales of typewriters. Since these three factors taken together point to the necessary recognition of typewriting as a basic writing tool,

research findings should be brought to bear on the continuous improvement of instruction.[1]

Any worthwhile program in typewriting requires continual review by those who teach the course. The long-range curriculum planner and the sweeping innovator have their purposes, but the everyday management of course requirements--the fair adjustment of work load and credit hours--is every teacher's business.[2] Yet, of the 62 four-year colleges and universities in the United States that contributed to a 1971 study, 49 require class periods in excess of credit hours as well as a teacher in charge of all periods in beginning typewriting.[3] Could the teacher's time be better spent?

The practice of requiring class periods beyond credit hours is strong in all laboratory courses; in contrast, the convention for non-laboratory courses is to synonymize the hours per week which a class meets with the credit hours per course. As a laboratory course, typewriting traditionally requires class periods beyond credit hours, most noticeably in the beginning course.[4] Such a dichotomy presents problems for administrators when it comes to balancing the faculty load, negotiating teaching contracts, and budgeting for instructional expenditures.[5] Administrators need to know the optimum time required

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[1]Leonard J. West, Implications of Research in Teaching Typewriting, 2nd ed. (St. Peter, Minnesota: Delta Pi Epsilon, 1974), p. 1.

[2]Marian J. Darst, "Credit-Hour and Class-Period Requirements for Typewriting and Shorthand," The Journal of Business Education 48 (October, 1973): p. 18.

[3]Ibid., p. 19.

[4]Ibid.

[5]James S. Fitzgerald, "A Way Out of the Faculty Load Muddle," Community and Junior College Journal 45 (May, 1975): pp. 30-31.

for direct teaching and teacher-supervised practice in a laboratory course.

Credit hours and classroom hours have often come about through compromising with external factors rather than knowing that the typewriting learning process benefits by those hours.[6] Do students accomplish more by having daily or frequent class meetings? Or, do certain types of beginning typewriting students require daily class meetings whereas other types of beginning typewriting students require less time to master the same material? If so, these students will benefit from a more flexible time schedule. In addition, it may develop more initiative and personal responsibility on the part of the student concerning his share in the learning process.

Significance of the Study

If a teacher can teach beginning college typewriting in three class hours of directed instruction weekly rather than five hours of directed instruction weekly and achieve the same goals under either condition, why waste the natural resources of labor and capital in a five-day syndrome (one community college merely equates the typewriting laboratories teaching load on a three sessions for two credits basis[7])? If the student can learn beginning college typewriting with less directed instruction, why waste his time in the longer instructional sequence (around 80 percent of colleges use the five-day sequence[8])?

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[6]Darst, "Credit-Hour and Class-Hour Requirements," p. 20.

[7]Collective Bargaining Agreement between Lehigh County Community College and Lehigh County Community College Faculty Association (an affiliate of PAHE/PSEA, NFA/NEA), 1974-75 (Mimeographed), p. 5.

[8]Darst, "Credit-Hour and Class-Hour Requirements," p. 19.

If certain types of students can learn beginning college typewriting in less time than other types of students, why not provide a type of flexible scheduling to meet their needs? In this age of ecology, why not save labor, time, energy, and capital if it is feasible to do so with respect to the scheduling of beginning typewriting classes?

Conceptual Framework

Several basic assumptions related to this study were as follows:

That the typewriter is a basic writing tool;

That all basic typewriting skills can be learned in a one-semester course;

That students learn typewriting as they interface with a typewriter;

That the subjects are able to execute their out-of-class assignments autonomously;

That the subjects do vary in motivational characteristics, i.e. why they desire to learn typewriting;

That the subjects possess an aptitude adequate for learning typewriting;

That the subjects possess varied abilities in their learning rates;

That the subjects vary in previous background and experience;

That identical learning situations do not necessarily produce identical achievement; and

That the hours spent in class should more closely approximate the course credit since some (perhaps all) students can complete some skill learning and practice outside of scheduled class hours on an as-needed and individualized basis.

Delimitations

The amount of time spent in the preparation of out-of-class assignments was not controlled, although it was reported by each student on a weekly report form.

The study was delimited to those students who were enrolled in the first semester of beginning typewriting in one two-year college during the fall term, 1975, and who were taught by one instructor.

The instruments used in this study were limited to a questionnaire, a cloze reading comprehension test, a tapping aptitude test, an internal-external locus of control scale, and a typewriting test. The reading level on the cloze test was established by the readability formula known as the Gunning Fog Index.[9]

Definition of Terms

The following section lists and defines the technical terms used in this study. For the most part, their meanings are ones which those who are acquainted with typewriting would be familiar. However, their relevance for this study is forthwith explained for benefit of other readers and for assuring uniformity in the use of the terms. The alphabetical order of the terms reflects the sequence of the hypotheses, followed by a section of miscellaneous terms.

HYPOTHESIS ONE TERMS

Achievement is performing so as to attain results which can be measured (when adjustments are made for initial differences) by the end

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[9]Blaine K. McKee, "Fog Can be Lifted," The Quill (April, 1965): pp. 110-112.

scores in gross words per minute on the straight-copy timed writing, in errors per minute on the straight-copy timed writing, and in total points scored on the production copy. (Each ending score is used as a criterion or dependent variable and the corresponding beginning score is used as the covariate.) Both the pretest and the posttest are the National Business Education Association Typewriting I--First Semester, Number One Test.

Beginning typewriting is defined by the Lehigh County Community College Catalog, 1975-76, as ". . . the development of the fundamental techniques that contribute to speed and accuracy. The student is introduced to extensive typing practice by simple business letters and forms."[10]

A class hour is one period of fifty minutes per day.

Directed instruction is a method of teaching in which the teacher is present in the classroom for the purpose of demonstrating, directing, controlling, and/or supervising all activities and experiences.

Errors per minute, hereafter most often referred to as EPM, is a means of expressing accuracy on straight-copy timed writings and is found by dividing the total number of errors made in a given period of time by the number of minutes in typewriting.

An EPM error is any misstroke, a repeated word, an omitted word, a transposition (typing words out of order), an improper indention, an improper alignment, and an abnormal shading. The spacing and punctuation after a word are a part of the word; thus, an error in them is an error in that word. Moreover, no more than one error may be counted against a word.[11]

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[10]Lehigh County Community College Catalog, 1975-76 (Schnecksville, Pennsylvania: Lehigh County Community College, 1975), p. 26.

[11]Alan C. Lloyd, John L. Rowe, and Fred B. Winger, Typing 75: Basic, (New York: Gregg Division of McGraw-Hill Book Co., 1970), Workguide p. 9.

A fifteen-week semester is synonymous with a one-semester course.

Five class hours constitute five separate fifty-minute periods held on Monday, Tuesday, Wednesday, Thursday, and Friday during the fifteen-week semester.

Gross words per minute is a commonly used means of expressing the typewriting speed on timed writings and is found by dividing the total gross words typed (five strokes equal one gross word) by the number of minutes of typewriting. Gross words per minute may be hereafter referred to as GWPM.

Production copy is problem typewriting that uses unarranged copy materials, the correction of errors, and the absence of prior guidance about how to carry out the task other than that which could be expected to be available in later-life typing situations.[12] Production copy may be hereafter referred to as PROD.

A straight-copy timed writing is typewriting done in a specified period of time from prearranged copy and in which the typist does not correct the errors.

Students are freshmen and sophomores on the community college level.

Three class hours constitute three separate fifty-minute periods held on Monday, Wednesday, and Friday during the fifteen-week semester.

Total points scored is a measure dependent on the quality and quantity of typewriting work which the student completes within the allotted time and is based on premeasured criteria. Each line of test copy correctly typed is worth a point value with additional points being added for such things as following directions and vertical as well as horizontal placement. The National Business Education Association

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[12]Leonard J. West, Acquisition of Typewriting Skills, (New York: Pitman Publishing Company, 1969), p. 599.

Typewriting I--First Semester, Number One Test, Administrators Manual,[13] identifies the specific bonus points for each part of the Test itself.

HYPOTHESIS TWO TERMS

Age is the chronological number of years of the student's life.

Cloze items are the blanks which stand for each deleted word in the selected cloze test passage.

Cloze procedure forces the reader to supply missing words in a passage, thereby providing closure of the sentence. This procedure consists of the deletion of every nth word from the reading passage, the replacement of such deleted words with standard-length blank lines, the determination of a fixed number of items in the test, and the preparation of instructions to be read and followed by the subjects for completing the test.[14]

Cloze response refers to the word written in the blanks by the reader of the passage.

Cloze score is the number of cloze responses which are identical to the original passage.

A cloze test is a test of understanding prepared in accordance with the cloze procedure cited above. In this study the cloze test is entitled "The Art of Listening."[15]

College major is business or non-business.

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[13]National Business Education Association, Students Typewriting Tests--Administrators Manual, 1974 (Washington, D.C.: National Business Education Association).

[14]Division of Vocational Education, New Jersey Department of Education, Reading in Business Education: Techniques and Implementation (Rider College Workshop, June 21-23, 1972), pp. 17-18. (Mimeographed.)

[15]Florence Nennich, "A Predictor Index for Use in Elementary Shorthand" (unpublished Doctor's dissertation, Temple University, 1974), p. 110.

External locus of control depicts one who scores more than the mean I-E point score on the Rotter Internal-External Control Scale (I-E).[16] In this study the mean score is 10.

Frustration or marginal level students are subjects who earn a raw score of 29 or lower on the cloze test entitled "The Art of Listening."[17]

Gunning readability formula, also known as the Gunning Fog Index, "is related to the number of years of education needed to read a passage with ease and understanding."[18]

High-tapping ability refers to the beginning typewriting students whose scores fall above the median raw score of 41 on "The Tapping Test."

Instructional or independent level students are subjects who earn a raw score of 29 or better on the cloze test entitled "The Art of Listening."[19]

Internal locus of control depicts one who scores less than the mean I-E point score on the Rotter Internal-External Control Scale (I-E).[20] In this study the mean score is 10.

Low-tapping ability refers to those beginning typewriting students whose scores fall below the median raw score of 41 on "The Tapping Test."

Previous typewriting instruction involves formal introduction to the typewriter in an academic setting.

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[16]Julian B. Rotter, "Generalized Expectancies for Internal Versus External Control of Reinforcement," Psychological Monographs: General and Applied 80 (1966): pp. 11-12.

[17]Nennich, "A Predictor Index in Elementary Shorthand," p. 57.

[18]McKee, "Fog Can be Lifted," p. 10.

[19]Nennich, "A Predictor Index in Elementary Shorthand," p. 57.

[20]Rotter, "Generalized Expectancies for Internal Versus External Control," pp. 11-12.

Sex designates male or female.

Student characteristics are internal-external locus of control; cloze reading comprehension; tapping aptitude; previous typewriting instruction; college major; age; typewriter ownership; and sex.

Tapping ability is a measure of the number of correct tapping responses to specific letters and finger assignments by beginning typewriting students on "The Tapping Test."[21]

"The Tapping Test" is an instrument restricted to the prediction of ordinary stroking proficiency (as measured in straight copy tests given in beginning typewriting) and of teachers' grades, based in part on straight copy performance.[22]

Typewriter ownership is the possession of a typewriter at one's residence.

MISCELLANEOUS TERMS

A competency is a task performed to a certain standard.[23]

Electric machines are commercially produced typewriters which require electricity to operate.

A laboratory course involves learning activities carried out by students in an appropriately equipped room or rooms devoted to the study of a particular subject (such as physics, botany, zoology, foods, chemistry, industrial arts, electronics, agriculture, mechanics, distributive education, office machines, printing, home economics, and

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[21]Robert Eugene Boose, "The Effects of Tapping Ability on the Use of Tactile Cues in the Acquisition of Typewriting Skills" (unpublished Doctor's dissertation, Temple University, 1974), p. 5.

[22]West, Acquisition of Typewriting Skills, p. 521.

[23]Estelle L. Popham, Adele Frisbie Schrag, and Wanda Blockhus, A Teaching-Learning System for Business Education (New York: McGraw-Hill, Inc., 1975), p. 39.

typewriting) and involving the practical application of theory through observation, experimentation, and research.[24]

Minority groups refers to blacks and Spanish Americans.

Performance goals are statements identifying what students should be able to do at the end of a learning sequence.[25]

A psychomotor (motor) skill is the habit of making complicated motor responses without giving conscious thought to the movements used.[26]

A skill is a habit or fixed way of making many complicated responses (usually at the subconscious level) to a variety of stimuli.[27]

Subcompetencies are the many things a student must be able to do in order to perform a task up to the standard of a specific competency.[28]

A tyro is a beginner in learning, i.e. a novice.[29]

Summary

The data on employment, typewriter sales, typewriter usage, and enrollment in typewriting classes demonstrate the mammoth use of the typewriter and the substantial potential for typewriting skill. Clearly, the typewriter ranks as a basic writing tool.[30] As such, research

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[24]Carter V. Good, ed., Dictionary of Education, 3rd ed. (New York: McGraw-Hill Book Company, 1973), pp. 326-329.

[25]Popham, Schrag, and Blockhus, A Teaching-Learning System for Business Education, p. 67.

[26]Ibid., p. 55.

[27]Ibid., p. 54.

[28]Ibid., p. 40.

[29]Webster's Seventh New Collegiate Dictionary, (Springfield, Massachusetts: G. & C. Merriam Company, 1969), p. 961.

[30]West, Implications of Research in Teaching Typewriting, p. 1.

findings should be brought to bear on the continuous improvement of typewriting instruction.

The purpose of this study was to examine the achievement of randomly assigned students to two scheduling variations (three days a week versus five days a week of directed instruction) in beginning college typewriting and to relate the assessment of the achievement level to selected student characteristics. The scheduling variation was to aid in determining whether beginning typewriting on the community college level should be taught in a five-day-a-week pattern or in a reduced three-day-a-week pattern. The student characteristic variables were deemed vital since personality, aptitude, and educational readiness were integrated into the learning process and students identified in terms of these characteristics may differ in their responsiveness to the amount of directed instruction class time.

The hypotheses for this study have been spelled out and the terms that will be used or referred to later on have now been stated and clarified. With definitions in hand, the data gathered for this study can better be interpreted. In the next chapter, the literature pertinent to the objectives of this study is reviewed for its definitive contributions.

CHAPTER II

REVIEW OF LITERATURE

Introduction

Related literature for this study was considered as that directly pertaining to comparisons of achievement in typewriting when the number of class meetings per week was different for two or more groups. In addition to literature studying these comparisons was that corpus of literature discussing in detail other variables within this study. Such inclusions were studies analyzing the cloze test, locus of control, and the tapping test.

Both vital resources and reliable criteria as to what to add to or to delete from this discussion were gleaned from Business Education Index, Dissertation Abstracts, Encyclopedia for Educational Research, ERIC Index, Master's Theses in Education, Readers' Guide to Periodicals, Research Studies in Education, Review of Educational Research, The Education Index, and professional associates.

Similar studies have been done in advanced and intermediate typewriting on the college level; however, there was no evidence of research for beginning college typewriting where achievement was compared with the number of class meetings per week for two or more groups of students. Furthermore, none of the studies recognized individual characteristics of students and related these

variables to achievement within a scheduling framework. The lack of such applications to beginning typewriting convinced this writer that a popular but neglected field lay ripe for research.

Variable Scheduling in Typewriting

Among advanced college typists, five meetings a week was no better than three meetings a week.[1] Hansen conducted an experimental study with students in seven different colleges and universities. Eight control groups met five days a week for class and eight experimental groups met three days a week for class (one college repeated the experiment two semesters).[2] The experimental groups were given assignments to be completed outside of class at a time and place chosen by the students, whereas the control groups completed all their required typewriting during the teacher-directed class sessions.[3]

The analysis of variance method, random replication design, was used to provide a statistical test of the significance of the differences between the control and experimental classes. In those instances where the F-test proved significant, a T-test was applied to individual pairs of means.[4]

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[1]Kenneth LeRoy Hansen, "The Effects of Varied Scheduling on Achievement in Advanced College Typewriting" (unpublished Doctor's dissertation, Colorado State College, 1965), p. 107.

[2]Ibid., p. 119.

[3]Ibid., p. 46.

[4]Ibid., p. 62.

The achievement measurement was determined by straight-copy writings, a production typewriting test, and a related information test.[5] Hansen offered the following recommendations from the study:

1. Advanced college typewriting should be taught on a three-period-a-week scheduling pattern rather than five periods a week.

2. Advanced college typewriting students should be given assignments to complete on days when class does not meet.

3. Advanced college typewriting students attending class three days a week should not be required to practice a specified number of hours a week or to attend specific laboratory periods. Students should be allowed to choose their own place and time for practice and for completing assignments.

4. Advanced college typewriting students should be encouraged to practice out of class on whatever typewriter is available.

5. Advanced college typewriting students should be given greater responsibility in meeting the course requirements.

6. Greater emphasis should be placed on production-type activities in advanced college typewriting.

7. The teacher of advanced college typewriting classes meeting three days a week should learn to use class time efficiently in the presentation of subject matter.

8. The teacher of advanced college typewriting classes meeting three days a week should be discriminating in selecting and using speed, accuracy, and technique drills.

9. The number of hours of teacher directed instruction each week in advanced college typewriting should be in agreement with the credit hours earned in the course. Teacher directed instruction in excess of three hours each week should be reduced to no more than three hours.[6]

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[5]Ibid., p. 119.

[6]Ibid., pp. 107-109.

First semester high school typewriting was researched by Missling who compared the traditional plan with classes meeting five days a week for 55 minutes each day with three selected flexible modular plans. The control (traditional plan) group met 275 minutes each week with no open-lab instruction. Experimental group I met 80 minutes per week plus optional open labs. The experimental group II met 175 minutes per week including the use of an open lab amounting to 35 minutes per day for each of five days a week. Experimental group III met for 36 minutes three times a week or 108 minutes per week, which instruction included open labs.[7]

These criteria were used to measure beginning typewriting achievement of the 240 students: one-minute straight copy timings given after the keyboard was presented (approximately mid-semester); one-minute straight copy timings at the end of the semester; and three production problem timings.[8] The measurements were analyzed by a one-way analysis of variance. Whenever there was significance, Scheffe's multiple comparisons test was used. Finally, two-way analysis of variance was used to interpret the data.[9]

The findings of this study support the following general conclusions:

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[7]Lorraine Missling, "A Comparison of the Traditional Plan to Three Selected Flexible Modular Plans in First Semester High School Typewriting with Straight-Copy Achievement and Production Achievement as Criteria" (unpublished Doctor's dissertation, University of North Dakota, 1970), pp. 30-31.

[8]Ibid., pp. xi-xii.

[9]Ibid., p. xii.

1. Beginning typewriting classes in the secondary school that meet for approximately 35 minutes every day and who have access to open labs generally achieve a higher rate of speed on straight-copy timings than other time arrangements.

2. Beginning typewriting classes in the secondary school that meet under the traditional plan of scheduling but who do not have access to open labs achieve a higher rate of speed on straight-copy timings than classes taught under flexible modular plans.

3. Beginning typewriting classes in the secondary school that meet according to the traditional plan of scheduling type more accurately on straight-copy timings.

4. Beginning typewriting classes in the secondary school that meet under various flexible modular plans of scheduling show considerable differences in speed achievement on straight-copy timings.

5. Beginning typewriting classes in the secondary school that meet under various flexible modular plans of scheduling show considerable differences in accuracy achievement on straight-copy timings.

6. Beginning typewriting classes in the secondary school that meet under the traditional plan of scheduling achieve the highest rate of speed in production typewriting.

7. Beginning typewriting classes in the secondary school show very little difference in accuracy on production timings regardless of the time arrangement under which they are taught.

8. Beginning typewriting classes in the secondary school that meet under various flexible modular plans of scheduling show considerable differences in speed achievement in production timings.[10]

Yuen conducted an experimental study to determine the effects of variable scheduling on the achievement of typewriting skill on the high school level. Classes meeting two, three, four, five and six periods per week were used in the experiment. The classes meeting four and six times each week met for double periods two days and three days per week, respectively. Each period was a

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[10]Ibid., pp. 93-95.

40-minute one.[11]

Achievement was determined by giving: (1) straight-copy tests at the end of every tenth lesson, at the end of every six-week period, and at the end of the semester; and (2) a production test at the end of the semester. The mean scores were compared by analysis of variance. The six-week scores and the semester-end results were compared to findings in other typewriting research. Based on the findings in his study, the following conclusions were made:

> 1. None of the experimental groups was able to exceed the performance standards reported in other studies.
>
> 2. The double-period groups did not exceed the performance of the other variable scheduling patterns in this study.
>
> 3. The overall effect of variable scheduling on the achievement of typewriting skill seems to be more accurate, but slower typing.[12]

The investigations of Hansen, Missling, and Yuen appear to have been thoroughly conducted and the findings have been carefully reported. Two other experimenters, Butler and Rasor, manipulated the number of weekly class meetings; however, one must be careful to notice the limitations of these studies.

Over 35 years ago, Butler experimented with a method of teaching college typewriting in which the instruction was individualized so as to meet the varying levels of ability of the students. One group of thirteen students received formal instruction four days a week while another group of thirteen students received

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[11]Jack Yuen, "The Effects of Variable Scheduling on the Achievement of Typewriting Skill," Dissertation Abstracts, 20:3138, January-March, 1960.

[12]Ibid., p. 3138.

formal instruction two days a week. The latter group worked from assignment sheets and when all the assignments on the assignment sheets were completed, students were excused from further classwork. The other group met four days each week regardless of whether or not they had the work completed in advance.[13]

Butler concluded that the assignment sheet method of teaching typewriting was profitable and successful after students had once learned the keyboard. Students in the two days a week group showed equivalent progress and completed work in less time, thus allowing more students to take typewriting.[14]

The validity of the Butler study might well be questioned in that the number of cases was extremely small, inadequate information regarding student typewriting abilities was reported, and no information was given regarding the reliability or validity of the tests used in this research.[15]

Over 25 years ago Rasor compared the achievement of 29 second-year high school typewriting students receiving instruction three periods a week for two years with the achievement of two classes of 34 and 37 second-year typewriting pupils receiving instruction five days a week for two years. Both classes meeting five periods a week scored significantly higher than the class meeting three periods a week on a thirty minute rough draft test given at the end of the second year. Moreover, the one class of 34 students meeting five

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[13]Lois Butler, "Individual Instruction in Typewriting" (unpublished Master's thesis, New Mexico Normal University, 1935), p. 82.

[14]Ibid., p. 97.

[15]Hansen, "The Effect of Varied Scheduling," p. 22.

days a week did significantly better than the three-day class of 29 on three straight-copy tests. The straight-copy tests consisted of a five-minute writing given at the beginning of the second year, a fifteen-minute writing given in the middle of the second year, and a fifteen-minute writing given near the end of the second year.

Rasor concluded that "To obtain the better results, typewriting should continue to be offered five periods a week in the public secondary schools of Dayton, Ohio."[16]

Limitations of this study were that straight-copy tests consisted of only one writing at three different times and that the reliability and validity of the rough draft test was not established.[17]

Do students in intermediate college typewriting classes who meet class four days a week with in-class assignments have greater gain in production typewriting skills than do students who meet class two days a week with out-of-class assignments? White answers this question with a "no."[18] Fifty students were randomly assigned to either the experimental group or the control group and the gains in production scores were measured through a production typewriting

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[16]Virginia Ann Rasor, "Comparisons of Results Obtained in a Course of High School Typewriting in a Three-Period Week and in a Five-Period Week" (unpublished Master's thesis, Kent State University, 1947), p. 49.

[17]Harves Rahe, "Review of Research in Typewriting, A Classification and Summary of Studies Completed Prior to 1949" (unpublished Doctor's dissertation, Indiana University, 1950), pp. 69-70.

[18]Kathryn Fern White, "An Experimental Study Utilizing Varied Scheduling and Out-of-Class Assignments in Intermediate Collegiate Typewriting" (unpublished Doctor's dissertation, Oklahoma State University, 1974), p. 70.

instrument known as the Helquist examination. The t-test was the statistical technique used to determine the degree of change between the pretest and the posttest.[19] The following conclusions resulted from the findings of the experiment:

> 1. Intermediate Typewriting can be taught as effectively with two hours a week in class and out-of-class assignments as with four hours a week in class and all assignments completed in class. This conclusion assumes that a teaching method similar to the one in this study is used whereby detailed instructions for the assignments are given in class and generous feedback concerning the accuracy of each assignment is given.
>
> 2. The accuracy skills of students who type assignments out of class do not differ from the accuracy skills of students who type assignments in class on problem or production typewriting.
>
> 3. The preparing of assignments without teacher supervision may possibly strengthen a student's ability to solve complex problems, as is suggested by the significant difference in gains in scores on the tabulation with columnar heading problem.
>
> 4. Students can work independently in production typewriting courses and can assume more personal responsibility for learning by utilizing out-of-class assignments.
>
> 5. A teacher need not be present to supervise the typing of production problems when adequate instruction and feedback are given to students.[20]

In retrospect, most of the research concerned with comparing achievement with the number of class meetings per week being different for two or more groups of typewriting students has been done on the secondary level or, when collegiate level, dealt with intermediate or advanced typewriting. Furthermore, this reviewer was unable to locate any studies on the community college level or any studies where recognition was given to the characteristics of students when reporting the amount of time needed to teach typewriting.

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[19] Ibid., pp. 48-49.

[20] Ibid., pp. 71-72.

The experiments and writings reviewed for this typewriting investigation indicated that five class meetings a week was preferable to less than five class meetings a week on the secondary level, that two weekly class meetings after the initial learning state may be as profitable and as successful as four weekly class meetings on the college level, and that five meetings a week proved no better than three among advanced college typewriting students.

Cloze Test

Literature for cloze test (as well as for locus of control and the tapping test) provides resources of definitive works which lead a researcher to anticipate a high correlation between it and typewriting achievement. This variable, along with others, was thus incorporated into this study to examine what intellectual, personal, and manipulative barometers do make for typewriting achievement.

Clozure has long been an important concept of gestalt psychology. We perceive objects as complete, unique units, not as "disjointed parts."[21] The whole pattern of experience is more important than analysis of the sum of its parts.[22] In skillful reading, the thoughts are picked up in patterns much as they are in speech, where how something is said is a clue to what is said overall. Since reading and listening to speech create expectations about "what is coming next," readers and listeners are aided in understanding by structural clues of function words--"on the," "in the," "a," and "the"--and of form

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[21]Clifford T. Morgan, Introduction to Psychology, 2nd ed. (New York: McGraw-Hill Book Company, Inc., 1961), p. 312.

[22]Lloyd S. Ruch, Psychology and Life, 4th ed. (New York: Scott, Foresman and Company, 1953), p. 21.

words--nouns, verbs, and adjectives. A student's skill at clozure reflects his mastery of the reading structure of his culture. Consequently, clozure is "the impulse to complete a structured whole by supplying a missing element; the reader supplies the missing words in a passage, thereby providing clozure of the sentence."[23] Any passage of prose may be used to apply this technique to the measurement of reading comprehension. In the passage selected to test clozure in this study, slightly less than half of the words to be filled in are function words. The others are words that would normally be used in talking about the art of listening or about being a good listener.

Pioneer work in cloze technique was done by Wilson Taylor with a group of college students. In his procedure words are systematically deleted from printed materials and replaced by numbered blanks which readers fill in.[24] He measured the effectiveness of prose by deleting words from a passage and had the subjects replace those words. In order for subjects' responses to be considered correct, the exact word which had been deleted had to be replaced.[25] Variations in this procedure have been used at primary levels to test reading comprehension. In one of these, Gallant concluded that cloze tests are valid and reliable measures

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[23]Division of Vocational Education, New Jersey Department of Education, Reading in Business Education: Techniques and Implementation (Rider College Workshop, June 21-23, 1972), p. 17. (Mimeographed).

[24]George Lewis Walters, "The Development and Refinement of Reading Skills in Business Education," (Doctor's dissertation, Northern Illinois University, 1975), p. 25.

[25]Florence Nennich, "A Predictor Index for Use in Elementary Shorthand," (unpublished Doctor's dissertation, Temple University, 1974), p. 21.

of reading comprehension for pupils in grades one, two, and three.[26] The findings of Wilson and Gallant are further supported by other studies in testing reading comprehension. As applied to beginning shorthand, Nennich found clozure to be over 60 percent effective in identifying high-risk students in first-semester shorthand classes at two-year colleges.[27]

The passage selected for testing clozure in this typewriting study is the one which Nennich found to be valid and reliable in her shorthand investigation. What implications it has for typewriting, although they may be surmised, must be tested. Whereas Nennich was trying to locate high-risk shorthand students, this study searches for a variable or variables which play a key role in the level of achievement in typewriting.

Locus of Control

Another variable to be considered in this study is the locus of control. Although a relatively new technique, it has had widespread application to the study of achievement of students. The basic tool for locus of control is a test developed by Julian B. Rotter based on research of others and of himself over a period of several years and is called Internal Versus External Control of Reinforcement.[28] His basic thesis--effects of reward depend in part on whether the person

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[26]Ibid., p. 22.

[27]Ibid., pp. 88-89.

[28]Julian B. Rotter, "Generalized Expectancies for Internal Versus External Control of Reinforcement," Psychological Monographs: General and Applied 80, (1966): pp. 1-28.

perceives the reward as contingent on his own behavior or independent of it--is borne out positively by extensive application of his 29 forced-choice item test, given largely to college students.

A student who is motivated internally should seek out knowledge and application on his own; whereas one who must be prodded along does psychologically rely on powerful others for motivation.[29] In an application of this variable to two different educational environments, Wright and Ducette found that locus of control correlates with achievement for students in a non-traditional setting but not for those in traditional settings. In another instance, on a test in which subjects were given a list of highly meaningful words with obvious category classifications, the correlations between organization and recall were consistently higher for internally controlled subjects than for externally controlled subjects. Furthermore, the internally controlled subjects evidenced a greater organization in doing their work than did the externally controlled.[30]

In yet another study, DuCette and Wolk applied the locus of control variable in investigating the relationship between achievement motivation and several dependent variables: preference for intermediate risk, estimation of future success and classroom test performance.[31] What was found was that only subjects who are

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[29]Robert J. Wright and Joseph P. DuCette, "Locus of Control and Academic Achievement," (n.d.), p. 2.

[30]Helmut Bartel, Joseph DuCette, and Stephen Wolk, "Category Clustering in Free Recall and Locus of Control," Journal of General Psychology 87 (October, 1972), p. 255.

[31]Stephen Wolk and Joseph P. DuCette, "The Moderating Effect of Locus of Control in Relation to Achievement-Motivation Variables," Journal of Psychology 41 (March, 1973), p. 69.

characterized as internals on Rotter's I-E scale produce data that are congruent with predictions from achievement-movitation theory.[32]

To appraise the locus of control and anxiety, Watson and Baumal administered the locus of control test to 565 females. They identified 30 internals (those with scores of 1-4) and 30 externals (those with scores of 15-21), had all subjects learn paired nonsense syllables, and tested them in skill or chance conditions. The resulting 60 students were put into a four-way formation--fifteen internal control and fifteen external control in the skill group, and fifteen internal control and fifteen external control in a chance group. Those in the skill condition were told that if they were unable to provide the correct response, they would receive a moderately painful electric shock. Those in the chance condition were told that they might or might not be shocked even when they correctly produced the response. The results show that internally controlled subjects are more concerned about their performance when they are in situations in which they do not have control, whereas externally controlled subjects show more concern in situations in which they do have control.[33] Overall, internally controlled subjects are more confident of their ability than are externally controlled subjects.[34]

As far as the value of locus of control and motivation to perform are concerned, a study done at the Navy Personnel Research and Develop-

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[32] Ibid.

[33] David Watson and Evelyn Baumal, "Effects of Locus of Control and Expectation of Future Control upon Present Performance," Journal of Personality and Social Psychology 6 (June, 1967), pp. 212-215.

[34] Ibid., p. 215.

ment Center in San Diego, California, found that the larger pattern of knowledge already available through the internal-external construct is substantiated. That is, internals have better mental health than externals, have more self-control, and are more achievement oriented. Furthermore, internals as employees are more motivated to work than externals, actually perform better, and see working hard as being more instrumental in obtaining what they want.[35]

With regard to the present study focusing on the development of typewriting skill, the previous educational research in locus of control suggests that it might be a useful variable to indicate how typing students do with their assignments once they are given problems to work.

The Tapping Test

No one who learns to type does so from the total lack of ability. One's prior experiences before ever sitting at a typewriter give the beginning typist a preparation. West noted this in his analysis of how typewriting skills are acquired.[36]

John C. Flanagan and Grace Fivars analyzed the task of typing by determining and defining the two distinct elements involved in the mechanics of typing: first, the ability to tap quickly and accurately with one finger at a time; and second, the ability to respond with a specific finger on perceiving a symbol. Based upon

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[35]Laurie A. Broedling, "Relationship of Internal-External Control to Work Motivation and Performance in an Expectancy Model," Journal of Applied Psychology 60 (June, 1975), pp. 65-70.

[36]Leonard J. West, Acquisition of Typewriting Skills, (New York: Pitman Publishing Corporation, 1969), p. 213.

this analysis, a miniature job sample simulating performance of tapping using fingers independently and responding to given symbols (rather than a pencil and paper test variety) was designed to predict aptitude in typing; thus, the Tapping Test was developed.[37]

Once the test was developed it was necessary to determine its reliability and validity. On the first issue, a reliability coefficient of .90 was obtained (scores on four of the test pages correlated with scores on the other five pages).[38] Based on a test of 121 students, almost 70 percent of them who had scores of 60 or above prior to typewriting instruction received grades of A or B at the end of the semester of instruction; thus, validity was established.[39] Moreover, after much additional research and findings of tryouts with more than 1,400 students in different schools, it appeared that the new Tapping Test was an effective predictor of typing grades and skill.[40]

Of its limitations, West points out that it is restricted to the prediction of ordinary stroking proficiency on straight copy performance. It is not intended to predict skill at job-task activities; but since it measures tapping motions of particular fingers before typing instruction takes place, the "scores on it have a demonstrated relationship with actual typing scores upon completion of training."[41]

Of the questions which Boose sought to answer, one of them

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[37]John C. Flanagan and Grace Fivars, "The Tapping Test--A New Tool to Predict Aptitude for Typing," The Delta Pi Epsilon Journal 6 (February, 1964), p. 35.

[38]Ibid.

[39]Ibid., p. 37.

[40]Ibid., p. 39.

[41]West, Acquisition of Typing Skills, p. 521.

concerned tapping ability. Specifically, he wanted to know "What differences in straight copy words per minute were exhibited by beginning typewriting students with various levels of tapping ability using keyboards with two tactile cue keys versus those with regular keyboards."[42] He found that beginning typewriting students classified as high-tapping ability were found to type more gross words per minute at the .05 level of significance, and that they were also found to have a better production typewriting achievement at the .01 level of significance.[43]

Since this present typewriting study focuses on students in beginning typewriting, but for slightly different reasons than those of Boose, The Tapping Test may have implications for this too. Those results await comment at a later part of this paper, however.

Pretest Performance

Individual differences are revealed by pretest performances. A true novice at a typewriter tends to type between five and fifteen words per minute, rather than the expected zero words per minute. Apparently the positive transfer from early learning--wholly of stimuli, partially of responses, and wholly of the ability to perceive the nature of the required associations is reflected in the hunt-and-peck experience.[44]

West did routine testing in beginning typewriting classes for several years and computed a correlation coefficient between pretest

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[42]Robert Eugene Boose, "The Effects of Tapping Ability and the Use of Tactile Cues in the Acquisition of Typewriting Skills," (unpublished Doctor's dissertation, Temple University, 1974), pp. 4-5.

[43]Ibid., p. 63.

[44]West, Acquisition of Typewriting Skills, p. 212.

performance and straight copy performance at the end of the first semester. His conclusions from these studies indicate three things:

(a) pretesting can give you a useful immediate index of the probable speed of aptitude among your students with regard to stroking rate;

(b) early errors are useless as a predictor of later accuracy

(c) and, the greater the amount of training preceding an initial measure, the more closely that initial measure will correlate with the later measure.[45]

With these foregoing insights at hand, it will be interesting to see what pretest performance clues this study might reveal.

Summary

The literature reviewed above has focused on definitive works bearing on the typewriting study undertaken in order to point out the direction they give for this study. One of the large areas of concern is whether or not typewriting classes should meet five or fewer days a week. Many experiments have been done and reported on to support the pros and cons of this. However, since typewriting is learned by interfacing with a machine, factors other than time must also be considered. It is for this reason that material relating to reading (cloze test), personality (locus of control), and aptitude (tapping test) have been included as variables for this study. Research which has been conducted in fields other than business as well as business courses shows the important role which these variables play on particular studies. Since they have been found important for other areas, it is hoped that their use in this study will prove significant also.

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[44] Ibid., p. 213.

CHAPTER III

METHODS AND PROCEDURES

Introduction

The purpose of this study was to determine whether or not college students in beginning typewriting who experience three class hours of directed instruction weekly achieve as well as those students who experience five class hours of directed instruction weekly in beginning typewriting at the same college, regardless of student characteristics. This chapter on research methods and procedures contains a description of the experimental design, the sample, the measures used, and the steps taken in carrying out the project.

Research Design

The experimental research design involved the comparison of an experimental and a control group in beginning college typewriting. The pretest-posttest control group design can be diagrammed as shown below.

R	O_1	X	O_2
R	O_3		O_4

As can be seen in this diagram, two groups are employed in this format; one group, the experimental group, received a treatment (X) while the second group, the control group, did not. The assignment of subjects to both groups was accomplished on a random basis (R). Both groups were given the pretest (O_1 and O_3) and a posttest (O_2 and O_4).

The treatment consisted of three class hours of directed

instruction weekly in beginning college typewriting for the experimental group; whereas the control group experienced the conventional five class hours of directed instruction weekly in beginning college typewriting at the same community college.

Description and Selection of the Sample

The population for this study consisted of 40 community college students who enrolled for beginning college typewriting but who did not qualify for advanced placement via a qualifying test administered during the pre-registration period. Thirty-five of the 40 subjects were business majors, most of whom were two-year secretarial science and one-year certificate majors. Three of the 40 subjects were male and four of the 40 subjects were in a minority group, i.e. black or Spanish-American. Their ages ranged from 17 to 43; the mode age was 18. Three-fourths of the subjects had experienced some type of work experience. When the scores of the tapping aptitude test, the cloze reading test, and the internal-external locus of control test were compared to previous studies, the distribution scores were comparable to those in the previous studies.

Lehigh County Community College, located in the state of Pennsylvania, served as the test site. Gleaned demographic variables include the following: most of the students are first generation college students; half of the full-time students work 15 or more hours a week; most students tend to come from lower middle class families; and 70% of the full-time students never have participated in an extracurricular activity in their freshman year. Academically, the institution tends to attract males who are high risk students because of their past performance in high school, and females who were average or above average in high

school but who tend to have limited vocational aspirations.[1]

The research took place during the fall, 1975, semester. Prior to the beginning of the semester, randomization took place during registration as follows: when students requested beginning typewriting, they were assigned either to section one or section two, beginning with the first student who registered and alternating thereafter.

Teaching and Testing Procedures

Both section one and section two were scheduled to meet for five 50-minute class periods a week in adjacent time segments. The same instructor taught both groups, using identical instructional materials, the same classroom, and the same equipment. The classroom had 32 typewriter stations with IBM standard electric typewriters. When this classroom was not in use for regularly scheduled classes, it was available for student use. Moreover, two other typewriting rooms in the same general location with IBM electric typewriters in them were also open during non-scheduled class times.

After the introduction of the alphabetic letter keys (lessons 1-12 and during the third week), three days were needed to administer these tests. The first test was The National Business Education Association Typewriting I--First Semester, Number One Test,[2] which consisted of two five-minute timed writings, a rough draft, a centering problem, and a business letter--all of which required keyboard use. In the second one, pen or pencil handwritten responses were obtained from

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[1]Robert Schussel, "A Study of the Factors that Influence Academic Success at LCCC." (Schnecksville, Pennsylvania: Lehigh County Community College, 1973), pp. 4-18. (Mimeographed.)

[2]National Business Education Association, Students Typewriting Tests, 1974 (Washington, D.C.: National Business Education Assn.).

each pupil for the Rotter Internal-External Control Scale (I-E),[3] a cloze reading test,[4] and a student questionnaire.[5] (Students who were absent on the day of testing were given the test on an individual basis via a taped recording of the testing day itself.)

When the initial testing series were completed, the instructor flipped a coin to determine which section would meet for three days a week (experimental) and which section would meet five days a week (control). Thereafter, the control group met at a regularly scheduled time (1 p.m.) for 50 minutes five times a week for a period of 12 weeks for a total of 60 additional directed-instruction lessons, whereas the experimental group met at a regularly scheduled time (2 p.m.) for 50 minutes three times a week for a period of 12 weeks for a total of 36 additional directed-instruction lessons.

Teaching was done in the usual manner without trying to vary between the control and the experimental groups. Faculty peers, upon the request of the researcher, made unannounced observations in both classes to comment on carrying out this objective. Observed factors included manner, approach, audio-visuals, voice, enthusiasm, questioning, organization, and attitude. From time to time, identical lessons were presented via professionally-prepared, purchased, taped instruction.

Homework assignments were made on Mondays and Wednesdays in both

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[3]Julian B. Rotter, "Generalized Expectancies for Internal Versus External Control of Reinforcement," Psychological Monographs: General and Applied 80: pp. 11-12.

[4]Florence Nennich, "A Predictor Index for Use in Elementary Shorthand" (unpublished Doctor's dissertation, Temple University, 1974), pp. 109-110; permission granted.

[5]Kenneth LeRoy Hansen, "The Effect of Varied Scheduling on Achievement in Advanced College Typewriting" (unpublished Doctor's dissertation, Colorado State College, 1965), pp. 227-228; permission granted.

groups. A typical assignment consisted of one lesson from the textbook[6] made up usually of a warm-up exercise, special drills, and a practice problem. During the early assignment weeks, the homework tasks were given orally; however, later assignments consisted of competency-based written tasks.

The control group completed the homework assignment during the regularly scheduled class meeting periods on Tuesdays and Thursdays, with the instructor present. When there was leftover time, additional teacher-supervised drill took place. The experimental group completed the same homework assignment as the control group but typed the assignment at the hour and place of their choosing. When a student in the experimental group had a question, the instructor was available during the two released class periods as well as during five regular office hours since no lab assistant was available.

Each student in both the groups had immediate feedback on the homework assignment via a proofguide,[7] was required to turn in his typed homework assignment on a daily basis, and recorded as well as turned in his outside-of-class practice time report on a weekly basis. The typed homework assignments were submitted to the instructor; however, to insure pre-grade confidentiality, the practice time report was submitted to a student volunteer in each class. Each student in both groups was encouraged to practice typewriting outside of class and was issued one-, two-, three-, and five-minute timings on recorded tape cassettes for the duration of the semester, should he wish to time any

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[6]Alan C. Lloyd, John L. Rowe, and Fred E. Winger, Typing 75: Basic (New York: Gregg Division of McGraw-Hill Book Co., 1970).

[7]The textbook, Typewriting 75: Basic, is actually a kit which consists of a 128-page text, a workbook, and a set of miniature keys (proofguides).

practice work. Cassette players were available in the library and could be checked out on the same basis as books.

During the final full week of instruction, one day was used to re-administer the pretest, that being the National Business Education Association I--First Semester, Number One Test, which then became the posttest. Scrupulous care, precision in timing the work, and written out sentence "speeches" were used to replicate the pretest administration in the posttest administration.[8] (Students who were absent on the day of testing were given the test on an individual basis via a taped recording of the testing day itself.)

The pretest and the posttest in typewriting were graded by the experimenter and rechecked by an experienced typewriting teacher as well as a clerical assistant, whereas all other instruments were scored by the experimenter and rechecked by a clerical assistant.

Testing Instruments

The data used to compare the achievement of the three day a week instruction with the achievement of the five day a week instruction were obtained from the National Business Education Association Typewriting I--First Semester, Number One Test (in Appendix A). Part A, the five minute straight-copy timed writing, provided the researcher with gross words per minute scores as well as with errors per minute scores. (Both timed writings were used as a basis for measurement and evaluation, rather than the better of the two performances.)[9] Part B, theme writing; Part C, centering; and part D, letter writing, jointly provided the total points

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[8]Leonard J. West, Acquisition of Typewriting Skills, (New York: Pitman Publishing Company, 1969), pp. 556-558.

[9]Ibid., p. 539.

scored on the production copy. When the pretest was given during the third week of class, subjects needed fifty minutes at the typewriter to take it; thus, when the same test was given during the fifteenth week of class, subjects needed fifty additional minutes at the typewriter to take the posttest.

The National Business Education Association Typewriting I--First Semester, Number One Test was selected for use in this study because it measured the three achievement variables in this study: gross words per minute, errors per minute, and production points scored. Then too, this instrument was designed to measure the achievement of beginning typewriting students at the end of the first semester of instruction, regardless of any specific textbook or teaching method.[10] Also, various reviewers have judged the content validity of the typewriting test to be high; i.e. the test content seems to represent what employed typists do.[11]

Originally, the Students Typewriting Test was standardized by the Typewriter Educational Research Bureau. The test was revised and distributed by the National Council for Business Educators in 1942. After the formation of the National Business Education Association, the test was again researched and developed.[12]

F. G. Nichols, then of Harvard University, planned and revised the early edition of the test. Thelma Potter Boynton, then of Teachers

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[10]National Business Education Association, Students Typewriting Tests--Administrators Manual, 1974 (Washington, D.C.: National Business Education Association).

[11]West, Acquisition of Typewriting Skills, p. 521.

[12]Robert Eugene Boose, "The Effects of Tapping Ability and the Use of Tactile Cues in the Acquisition of Typewriting Skills," (unpublished Doctor's dissertation, Temple University, 1974), p. 49.

College, Columbia University, and a special committee of the National Council for Business Education prepared revisions of the test. During 1968 the test was revised by the Theta Chapter of Delta Pi Epsilon at Indiana University; by Ruthetta Krause, Indiana State College (Terre Haute); by Ruth Anderson, North Texas State University; and by a committee of Research Division of the National Business Education Association.[13]

The reliability measures of the National Business Education Association Typewriting I--First Semester, Number One Test were reported by Valencia.[14] Two weeks after the initial scoring the tests were scored by three experienced business teachers. The interrater consistency in scoring the test in terms of the Pearson r were beyond r = .90. When calculating the interval in which to expect the scoring relationships to fall at the .95 confidence level, the lowest coefficient (.91) between the two raters was used. The scoring relationships between two raters was reported as falling within the interval r = .68 to .97 after using the Fisher Z transformation formula (Fisher Z = .84 to 2.18).

Using the total test scores in the test-retest procedure, the coefficients of correlation between the two testings were beyond r = .94 in terms of the Pearson r. The coefficients of correlation between two testings of the four subscores (test parts A, B, C, and D) were beyond r = .70. Altogether, the report documented a high relationship in the test scores for use as an instrument to measure typewriting achievement at the end of one semester of instruction.

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[13]Ibid.

[14]Atilano A. Valencia, "Reliability Measures of NBEA's Student Typewriting Test," Business Education Forum 24 (December, 1969): pp. 31-32.

Yuen[15] used the National Business Education Association Typewriting I--First Semester, Number One Test to compare the effects of variable scheduling on straight copy and production typewriting proficiency after 18 weeks of instruction. Prior to his experimental scheduling study, he conducted a pilot study to determine the reliability of interrater and intrarater scoring of the test. Yuen found that when four raters referred to and followed the scoring directions provided in the manual (as this study has), there was a high relationship between their scores compiled on 32 test samples ($r = .65$ to $r = .97$).

Although the data used to measure typewriting achievement were secured from the Number One Test, the data used to analyze the other student characteristics and their relationship to the frequency of directed instruction were obtained from these instruments: The Rotter Internal-External Control Scale (I-E), a cloze reading comprehension test, The Tapping Test, and a student questionnaire.

The Rotter I-E scale is a 29-item, forced choice, pencil and paper test including six filler items (in Appendix A). During the third week of class, subjects needed approximately 10 minutes to take this quiz. The data categorized students into internal (the disposition to attribute to oneself some control over one's reinforcement) or external (the disposition to believe that reinforcements are controlled by fate, chance, or powerful other) dichotomies. The I-E measure was chosen for use in this study because it was theorized that internal students might achieve higher scores than external students when the directed-instruction time was decreased. Then too, test-retest reliability seems quite consistent. Moreover, for most findings there are replications

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[15]Jack Yuen, "The Effects of Variable Scheduling on the Achievement of Typewriting Skill," Dissertation Abstracts, 20:3138, January-March, 1960.

sometimes in other laboratories, sometimes with other kinds of populations, and sometimes with different methods of measurement and techniques of producing situational or condition effects.[16]

To determine the student's facility to comprehend printed material, a cloze reading comprehension test was administered during the third week of class. The cloze selection (in Appendix A) is twelfth grade reading level material according to the Gunning Fog Index and consists of 282 words with every fifth word deleted, or fifty blank spaces. The deleted words in the selection are replaced by blanks, fifteen typewriter spaces in length. The similarity of space available for word insertion is to avoid word length hints. The chosen selection, "The Art of Listening," has been validated in a study of six two-year colleges where 311 female students were enrolled in first-semester shorthand classes. In this study the results indicated that "of the five variables, cloze was the most meaningful in being able to distinguish between the high and low scores and final grades."[17] Since the out-of-class homework assignments required reading comprehension of both textbook materials and of assignment sheets, it was believed that this variable might be related to typewriting achievement.

The Tapping Test (in Appendix A) is a tool to predict aptitude for typing. The twelve-page test took 45 minutes to administer. The examinee was required to tap quickly and accurately with one finger at a time and to associate a specific finger movement with a specific letter of the alphabet. Color-saturated felt dots were attached to the finger tips and the tapping was done in a test booklet in which printed circles

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[16]Rotter, "Internal Versus External Control," pp. 10-25.

[17]Nennich, "A Predictor Index in Elementary Shorthand," pp. 60-86.

represent the surfaces of eight typewriter keys--a miniature alphabet. A reliability coefficient of .90 and validity coefficients (for two separate criteria) of .39 and .38 were obtained when the test was given to 570 to 870 beginning typists in from seven to twelve schools;[18] thus, this aptitude test was incorporated into the variable model to predict typewriting achievement.

The final instrument used in this study was the student questionnaire, the purpose of which was to secure background information for each of the participating students (in Appendix A). The information in this questionnaire required the student to recall facts about himself, including previous typewriting instruction, college major, age, typewriter ownership and sex. Perhaps a student with previous typewriting instruction (although lacking enough proficiency to place into a higher-level course via the placement test) achieves better than the novice, regardless of the number of class meetings per week. Of course, a business major, as opposed to a non-business major, would be more serious in his pursuit of a typewriting skill and, as such, would achieve a higher degree of proficiency than a non-business major--or would he? Typewriter ownership would expedite out-of-class assignments, would encourage extra practice, and might even be a factor in typewriting achievement. Then too, age and sex might reveal some relationship to beginning college typewriting skill. Each one of these six recall items was excerpted from a typewriting questionnaire used for 269 subjects in seven different colleges and universities.[19]

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[18] John C. Flanagan and Grace Fivars, "The Tapping Test--A New Tool to Predict Aptitude for Typing," Delta Pi Epsilon Journal 6 (February, 1964): pp. 33-39.

[19] Hansen, "The Effect of Varied Scheduling," pp. 62-64; 227-228.

Statistical Procedures

Two statistical techniques were used to test the hypothesis. Analysis of covariance was used to compare the three-day-a-week instruction with the five-day-a-week instruction (hypothesis 1), whereas regression analysis was used to measure the relationship of student characteristics to typewriting achievement and to assess this measured relationship in terms of the frequency of directed instruction (hypothesis 2 and 3). The CDC 6400 computer at Temple University was used to process the data.[20] The level of significance for this study was .05 or below.

Before performing the analysis of covariance, the assumptions of the model were checked. Besides the usual assumptions of the analysis of variance, namely normal distribution of data and homogeneity of variance, the analysis of covariance model had two additional ones: (1) the equality of regression coefficients and (2) a pooled regression coefficient different from zero.[21] These assumptions (1) and (2) were tested by the CANOVA[22] computer program and the values derived indicated that all assumptions were met. An additional assumption, that the variances be the same for both groups, was not directly tested by the CANOVA program; however, the groups appeared quite similar. Thus, the F-Test computed by the CANOVA program was used to test hypothesis one.

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[20]Access to the computer programs was facilitated by Deborah Lurie, Department of Scientific and Academic Systems, Temple University Computer Activity Center, Philadelphia, Pennsylvania (February 1976).

[21]B. J. Winer, Statistical Principles in Experimental Design, 2nd ed. (New York: McGraw Hill, 1971), pp. 752-812.

[22]David D. S. Poor, Component Analysis of Variance Including Multivariate Analysis of Variance (Philadelphia, Pennsylvania: Temple University, 1973). (Computer printout.)

The regression analysis, required to test the remaining two hypotheses, was run through the SPSS[23] program.

Summary

What has been shown in the preceding discussion has been the design of a research project that was planned during the first six months of the 1975 year and carried out during the last four months of the same year. Forty randomly assigned students at Lehigh County Community College participated in a beginning college typewriting experiment to determine: (1) whether beginning typewriting on the community college level should be taught in a five-day-a-week pattern or in a reduced three-day-a-week pattern; (2) what, if any, relationship exists between the achievement level in beginning college typewriting and the following student characteristics: locus of control, cloze reading comprehension, tapping aptitude, previous typing instruction, college major, age, typewriter ownership, and sex; and (3) what, if any, relationship exists between student achievement level in beginning college typewriting and student characteristics for those students experiencing three or five class hours of directed instruction weekly.

The vehicles for gathering information against which to judge achievement in the two classes were specific tests and a questionnaire, all of which were previously validated in other environments. Whereas Chapter I introduced the problem, Chapter II built up hope as to what might be expected in the study because of what has been found in related studies,

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[23]Norman Nie et. al., Statistical Package for Social Sciences, 2nd ed. (New York: McGraw-Hill, 1975), pp. 320-367.

and chapter III delineated the methods and procedures used in this research. With preparations thus completed, the findings may now be examined in their turn.

CHAPTER IV

FINDINGS

Introduction

This chapter presents the data derived from testing the hypotheses and reports the results of their testing as proposed in Chapter I. The statistical techniques used to accomplish these objectives, described in Chapter III, consisted of analysis of covariance for hypothesis 1 and of multiple regression for hypotheses 2 and 3.

Statistical Analysis

Hypothesis One

No significant difference exists between the achievement level of college students experiencing three class hours of directed instruction weekly in beginning typewriting and those students experiencing five class hours of directed instruction weekly in beginning typewriting at the same college.

Achievement level was measured in terms of gross words per minute (GWPM) on straight copy, errors per minute (EPM) on straight copy, and production (PROD) points scored on a manuscript, a tabulation, and a letter. The control group met five days a week, whereas the experimental group met three days. The mean scores achieved by each of these groups on these three measures are presented in Tables 1, 2, and 3.

TABLE 1

Means and Standard Deviations of Variables on
Gross Words Per Minute (GWPM) of Pretest and Posttest for
Control (Five Days a Week) and Experimental (Three Days a Week) Groups

Variable	Control		Experimental	
	Means	SD	Means	SD
GWAM Pretest	34.685	11.522	31.560	13.442
GWAM Posttest	43.051	9.387	40.130	11.616

TABLE 2

Means and Standard Deviations of Variables on
Errors Per Minute (EPM) of Pretest and Posttest for
Control (Five Days a Week) and Experimental (Three Days a Week) Groups

	Control		Experimental	
	Means	SD	Means	SD
EPM Pretest	2.475	1.540	2.885	1.628
EPM Posttest	2.370	2.132	2.270	1.119

TABLE 3

Means and Standard Deviations of Variables on
Production Copy (PROD) of Pretest and Posttest for
Control (Five Days a Week) and Experimental (Three Days a Week) Groups

	Control		Experimental	
	Means	SD	Means	SD
PROD Pretest	55.600	28.511	57.250	33.018
PROD Posttest	102.500	30.732	104.950	50.708

Analysis of covariance was performed on each achievement measure using the pretest as the covariate and the posttest as the dependent variable. The assumptions of ANCOVA as described in Chapter III on page 44, were tested and satisfied, thus justifying the use of the pretest as the covariate. The results presented in Tables 4, 5, and 6 show that there was no difference between the two groups on any of these measures. Thus, as a result of the analysis of covariance, hypothesis one was accepted.

Hypothesis Two

No significant relationship exists between the achievement level in beginning college typewriting and the following student characteristics:

2a. locus of control
2b. cloze reading comprehension
2c. tapping aptitude
2d. previous typing instruction
2e. college major
2f. age
2g. typewriter ownership
2h. sex

As was true in hypothesis one, achievement level was measured in terms of gross words per minute (GWPM) on straight copy, errors per minute (EPM) on straight copy, and total production (PROD) points scored on a manuscript, a tabulation, and a letter.

The scores for the locus of control, cloze reading comprehension, and tapping aptitude instruments used in this study were distributed as follows: locus of control had a mean of 10.1, a median of 10.7, and a standard deviation of 3.8; cloze reading comprehension had a mean of 27.5, a median of 30.0, and a standard deviation of 9.6; and tapping aptitude had a mean of 41.4, a median of 41.3, and a standard deviation of 15.3.

TABLE 4
ANCOVA for Gross Words Per Minute (GWPM)

Source of Variance	DF	SS[a]	MS[b]	F	Prob.
Groups	1	3.356	3.356	.136	.714
Within Cell Error	37	910.321	24.603		

[a]Sum of the Squares
[b]Mean Squares

TABLE 5
ANCOVA for Errors Per Minute (EPM)

Source of Variance	DF	SS	MS	F	Prob.
Groups	1	.454	.454	.164	.688
Within Cell Error	37	102.673	2.775		

TABLE 6
ANCOVA for Production Copy (PROD)

Source of Variance	DF	SS	MS	F	Prob.
Groups	1	6.515	6.515	.008	.930
Within Cell Error	37	30967.263	836.953		

The questionnaire revealed that 30.8 of the students had not had previous typewriting, while 69.2% had previous typewriting instruction. Business majors accounted for 87.2% of the beginning college typewriting enrollment while 12.8% of the students were not business majors. The age of the students in this sample ranged from 17 to 43, with a mean of 21 and a standard deviation of 5.6. Whereas 30.8% owned their own typewriters, 69.2% did not. There were 90.5% females in the study and 9.5% males.

Upon initial inspection of the data, the proportion of males (9.5%) and the proportion of non-business majors (12.8%) was found to be too small to yield meaningful estimates.[1] Hence, sex and college major were not used in the multiple regression analysis. However, this same primary inspection of the data led the researcher to the inclusion of an additional input variable: the pretest itself. Perhaps the initial measure of student typewriting ability might predict future typewriting performance. Moreover, typewriting teachers clearly understand typewriting tests whereas they are generally not too familiar with tests which determine locus of control, cloze reading comprehension, and tapping aptitude. Thus, multiple regression analysis was performed with achievement as the dependent variable and six of the eight original independent variables during the first run. During the second run, seven independent variables were analyzed: six of the original ones plus one additional variable, i.e. the pretest itself.

The results of the first multiple regression on gross words per minute are presented on Tables 7 and 8. The overall fit of the

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[1]George W. Snedecor and William G. Cochran, Statistical Methods, 6th ed. (Ames, Iowa: Iowa State University Press, 1967), pp. 228-257.

TABLE 7

R^2 and ANOVA for Gross Words Per Minute (GWPM)
Without Pretest--Six Variables

Source of Variance	DF	SS	MS	F	Prob.
Regression	6	1262.02	210.33	2.26	.061
Residual	33	3061.24	92.76		
R^2 = .29191					

TABLE 8

Multiple Regression for Gross Words Per Minute (GWPM)
Without Pretest--Six Variables

Variable	Regression Coefficient	Standard Error B	F-Value	Prob.
Locus	-3.17	3.43	.854	.362
Tapping	6.29	3.35	3.529	.069
Previous Typing	9.47	3.86	6.017	.020*
Own Typewriter	2.61	3.53	.544	.466
Age	.07	.31	.062	.804
Cloze	2.92	3.56	.673	.418
Constant	28.51	10.37	7.560	.010

*Significant

TABLE 9

R^2 and ANOVA for Gross Words Per Minute (GWPM)
With Pretest--Seven Variables

Source of Variance	DF	SS	MS	F	Prob.
Regression	7	3796.43	542.34	32.94	.000*
Residual	32	526.84	16.46		
R^2 = .87814					

*Significant

TABLE 10

Multiple Regression for Gross Words Per Minute (GWPM)
With Pretest--Seven Variables

Variable	Regression Coefficient	Standard Error B	F-Value	Prob.
Pretest GWPM	.84	.06	153.937	.000*
Locus	-.72	1.45	.248	.621
Tapping	3.54	1.42	6.141	.019*
Previous Typing	-5.55	2.02	7.489	.010*
Own Typewriter	1.45	1.49	.945	.338
Age	-.01	.13	.006	.939
Cloze	-.08	1.51	.003	.957
Constant	15.48	4.49	11.869	.002

*Significant

model as assessed by the square of the multiple correlation coefficient (R^2 = .29) and the F-Test in the ANOVA Table (F = 2.26, P $>$ .05) is that the model did not predict GWPM achievement level. The regression coefficient, the standard errors, and the test of significance for the six variables (locus of control, tapping test, previous typing instruction, typewriter ownership, age, and cloze reading comprehension) presented in Table 8 show a significant relationship between previous typewriting instruction and achievement level for gross words per minute in beginning college typewriting.

The analysis of the extended model which added the pretest as the seventh independent variable is presented in Tables 9 and 10. One may conclude that this model is able to predict GWPM achievement on the basis of an R^2 = .88 and an F-Value = 32.9 (P $<$ .001). The analysis of the regression coefficient of each variable as presented in Table 10 revealed several significant factors in this prediction--the pretest, the tapping test, and previous typewriting instruction.

Next, achievement level in beginning college typewriting was measured in terms of errors per minute on straight copy as shown in Tables 11 and 12. The overall fit of the model as assessed by the square of the multiple correlation coefficient (R^2 = .15) and the F-Test in the ANOVA Table (F = 1.02, P $>$ .05) is that that hypothesized model did not work. The regression coefficient, the standard errors, and the test of significance for the six variables (locus of control, tapping test, previous typing instruction, typewriter ownership, age, and cloze reading comprehension) presented in Table 12 show a significant relationship between age and EPM achievement.

TABLE 11
R^2 and ANOVA for Errors Per Minute (EPM)
Without Pretest--Six Variables

Source of Variance	DF	SS	MS	F	Prob.
Regression	6	17.29	2.88	1.02	.428
Residual	33	92.98	2.81		
R^2 = .15686					

TABLE 12
Multiple Regression for Errors Per Minute (EPM)
Without Pretest--Six Variables

Variable	Regression Coefficient	Standard Error B	F-Value	Prob.
Locus	-.62	.59	1.106	.300
Tapping	-.55	.58	.890	.352
Previous Typing	-.17	.67	.064	.801
Own Typewriter	.20	.61	.110	.742
Age	-.11	.05	4.202	.048*
Cloze	-.52	.62	.720	.402
Constant	5.58	1.80	9.550	.004

*Significant

TABLE 13
R^2 and ANOVA for Errors Per Minute (EPM)
With Pretest--Seven Variables

Source of Variance	DF	SS	MS	F	Prob.
Regression	7	21.49	3.07	1.10	.383
Residual	32	88.78	2.77		
R^2 = .19490					

TABLE 14
Multiple Regression for Errors Per Minute (EPM)
With Pretest--Seven Variables

Variable	Regression Coefficient	Standard Error B	F-Value	Prob.
Pretest EPM	.21	.17	1.512	.228
Locus	-.46	.60	.590	.448
Tapping	-.38	.59	.414	.524
Previous Typing	-.08	.67	.016	.897
Own Typewriter	.31	.61	.252	.619
Age	-.10	.05	3.447	.073
Cloze	-.53	.61	.757	.391
Constant	4.48	2.00	4.988	.033

The analysis of the extended model which added the pretest EPM scores as the seventh independent variable is presented in Tables 13 and 14. One must conclude that the model is not able to predict EPM achievement on the basis of an $R^2 = .19$ and an F-Value = 1.10 ($P > .05$). The analysis of the regression coefficient of each variable as presented in Table 14 revealed no significant factors in this EPM prediction.

Finally, the achievement level was measured in terms of total production points scored on a manuscript, a tabulation, and a letter. The results of the multiple regression on PROD are presented in Tables 15 and 16. The overall fit of the model as assessed by the square of the multiple correlation coefficient ($R^2 = .30$) and the F-Test in the ANOVA Table ($F = 2.36$, $P > .05$) is that the model did not predict PROD achievement level. The regression coefficient, the standard errors, and the test of significance for the six variables (locus of control, tapping test, previous typewriting instruction, typewriter ownership, age, and cloze reading comprehension) presented in Table 16 show a significant relationship between previous typing instruction and achievement level for production copy in beginning college typewriting.

The analysis of the extended model which included the pretest PROD scores as the seventh independent variable is presented in Tables 17 and 18. One may conclude that this model is able to predict PROD achievement: $R^2 = .58$ and F-Value = 6.47 ($P < .001$). The analysis of the regression coefficient of each variable is presented in Table 18 and revealed one significant factor in this PROD prediction--that of the PROD pretest itself.

TABLE 15
R^2 and ANOVA for Production Copy (PROD)
Without Pretest--Six Variables

Source of Variance	DF	SS	MS	F	Prob.
Regression	6	20119.88	3353.31	2.36	.052
Residual	33	46740.09	1416.36		
R^2 = .30093					

TABLE 16
Multiple Regression for Production Copy (PROD)
Without Pretest--Six Variables

Variable	Regression Coefficient	Standard Error B	F-Value	Prob.
Locus	-4.99	13.41	.138	.712
Tapping	16.86	13.09	1.659	.207
Previous Typing	48.21	15.09	10.195	.003*
Own Typewriter	14.53	13.82	1.104	.301
Age	1.05	1.24	.727	.400
Cloze	16.38	13.91	1.386	.247
Constant	23.20	40.52	.327	.571

*Significant

TABLE 17
R^2 and ANOVA for Production Copy (PROD)
With Pretest--Seven Variables

Source of Variance	DF	SS	MS	F	Prob.
Regression	7	39190.09	5598.58	6.47	.000*
Residual	32	27669.88	864.68		
R^2 = .58615					

*Significant

TABLE 18
Multiple Regression for Production Copy (PROD)
With Pretest--Seven Variables

Variable	Regression Coefficient	Standard Error B	F-Value	Prob.
Pretest PROD	.92	.19	22.054	.000*
Locus	-9.33	10.51	.788	.381
Tapping	-.21	10.85	.000	.984
Previous Typing	12.55	14.03	.800	.378
Own Typewriter	12.27	10.81	1.288	.265
Age	.26	.98	.072	.790
Cloze	4.87	11.14	.191	.665
Constant	31.24	31.71	.970	.332

*Significant

As a result of the multiple regression analyses, hypothesis two was accepted. The set of six variables originally hypothesized as a whole cannot be used to predict gross words per minute, errors per minute, or production copy achievement in beginning college typewriting. However, administration of the pretest improves the model considerably as witnessed by the results discussed above for GWPM and PROD.

Hypothesis Three

The relationship between the achievement level in beginning college typewriting and student characteristics for students experiencing three class hours of directed instruction weekly is not different from the relationship for students experiencing five class hours of directed instruction weekly.

To test hypothesis three the model described above was estimated and tested for each group separately. The results of the two multiple regressions were compared to see if the model behaved in the same way in both groups. Complete results of the regressions are presented in Appendix B. Tables 19-20 refer to the original model for GWPM, whereas Tables 21-22 include the added pretest variable for GWPM. Tables 23-24 refer to the original model for EPM, whereas Tables 25-26 include the added pretest variable for EPM. Tables 27-28 refer to the original model for PROD, whereas Tables 29-30 include the added pretest variable for PROD.

With respect to GWPM, the original model (with six independent variables) worked for the experimental group ($R^2 = .58$, $F = 3.03$, $P < .05$); however, it continued to fail for the control group. The

models for EPM and PROD failed in the individual groups as they did for the entire sample.

When the pretest was added to the models, both groups showed the same results; namely, that the pretest did predict GWPM, but that it failed to predict EPM and PROD. These results were similar to those found in hypothesis 2 for the whole sample, except for the case of PROD. Here the models for individual groups failed to reach significance at the .05 level but they did reach it at the .10 level. The fact that this model did not reach significance can probably be explained by the reduced sample sizes in the individual groups.

Thus, one must reject the null hypothesis for the achievement variable GWPM, but may accept it for EPM and PROD.

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Purpose of the Study

The purpose of this study was to determine (1) whether beginning typewriting on the community college level should be taught in a five-day-a-week pattern or in a reduced three-day-a-week pattern; (2) what, if any, relationship existed between the achievement level in beginning college typewriting and the following student characteristics: locus of control, cloze reading comprehension, tapping aptitude, previous typing instruction, college major, age, typewriter ownership, and sex; and (3) if any relationship existed between student achievement level in beginning college typewriting and student characteristics, was it the same for those students experiencing three class hours of directed instruction weekly as well as for those students experiencing five class hours of directed instruction weekly.

Procedures

The experimental design consisted of a pretest-posttest control group design. Community college students at one institution who wished to enroll for typewriting but who did not qualify for advanced placement via a qualifying test were randomly assigned into two sections of beginning typewriting. The control group met five days a week whereas the experimental group met three days a week. Both

groups were assigned identical problems, were given the same instructions for the completion of the problems, were given the same feedback, and were encouraged to record their practice time. Students in the control group typed the assigned problems in the regularly scheduled class periods whereas students in the experimental group typed the assigned problems outside of class.

Following the introduction of the alphabetic letter keys, a pretest was administered to the students. During the final week of classes, the pretest was re-administered, which then became the posttest. This standardized test measured achievement in terms of gross words per minute on straight copy, errors per minute on straight copy, and production points scored on a manuscript, a tabulation, and a letter.

Student variables were secured by means of a questionnaire, an internal-external control scale, a cloze reading comprehension test, and a tapping aptitude test.

The statistical techniques used to test the null hypotheses consisted of analysis of covariance and of multiple regression. Analysis of covariance was performed on each achievement measure using the pretest as the covariate and the post-test as the dependent variable. The experimental group was compared with the control group once the data had been adjusted for the pretest. Multiple regression analysis was performed with achievement as the dependent variable and student characteristics as the independent variables.

Description of the Sample

The sample was comprised of students enrolled in two sections of beginning typewriting during the 1975 fall term at Lehigh County

Community College in the state of Pennsylvania. The 40 students in this study were primarily business majors, were primarily female, and were primarily full-time students. Ten percent of the students represented minority groups. The scores of the tapping aptitude test, the cloze reading comprehension test, and the internal-external locus of control test revealed that students in the present study were similar to subjects in previous studies.

Findings

An analysis of the data secured in this study revealed the following three findings.

1. Beginning college typewriting classes meeting five class hours a week did not achieve significantly better than classes meeting three class hours a week on the following measures of achievement: gross words per minute (GWPM) on straight copy; errors per minute (EPM) on straight copy; and production points scored (PROD) on a manuscript, a tabulation, and a letter.

Finding number one hinged on out-of-class assignments being given in lieu of in-class meetings. Most of the students in this study did record the amount of time they spent on out-of-class typewriting; however, records were not complete for every student. From the reports that were completed, the findings indicated that the mean time spent on out-of-class typewriting was 65 minutes a week for the control group and 131 minutes a week for the experimental group. When the additional two 50-minute class periods were added to the control group typewriting time, the control group practiced 165 minutes a week compared to 131 minutes a week for the experimental group. In

spite of this nearly half-hour per week of time difference, the control group did not achieve significantly better than the experimental group with respect to GWPM, EPM, and PROD achievement.

2. No significant relationship existed between the achievement level (measured in terms of GWPM, EPM, and PROD) in beginning college typewriting and the following student characteristics: locus of control, cloze reading comprehension, tapping aptitude, previous typing instruction, age, and typewriter ownership.

However, there was a significant relationship between the achievement level (measured in terms of GWPM and PROD, omitting EPM) and one of the independent variables--previous typewriting instruction. Moreover, administration of a pretest immediately following the presentation of the alphabetic keyboard was the most significant predictor of achievement in beginning college typewriting when achievement was measured in terms of GWPM and PROD, omitting EPM.

None of the following independent variables proved significantly able to predict EPM achievement on straight copy: EPM pretest scores, locus of control, cloze reading comprehension, tapping aptitude, previous typewriting instruction, age, and typewriter ownership.

3. There was a significant relationship, although a marginal one, between student achievement level (measured in terms of only GWPM) in beginning college typewriting and student characteristics (without the GWPM pretest) for those students experiencing three class hours of directed instruction weekly. On the other hand, there was no significant relationship between student achievement level (measured in terms of only GWPM) in beginning college typewriting and student characteristics (without the GWPM pretest) for those students

experiencing five class hours of directed instruction weekly. Thus, the relationship (based on the reduced sample sizes in the two individual groups) between the GWPM achievement level in beginning college typewriting and student characteristics (locus of control, cloze reading comprehension, tapping aptitude, previous typewriting instruction, age, and typewriter ownership) for students experiencing three class hours of directed instruction weekly was different from the relationship for students experiencing five class hours of directed instruction weekly.

When the GWPM pretest scores were added to the model, a significant relationship existed and it was the same for both groups, i.e. the relationship between the GWPM achievement level in beginning college typewriting and student characteristics (including the GWPM pretest) for students experiencing three class hours of directed instruction weekly was not different from the GWPM achievement level in beginning college typewriting and student characteristics (including the GWPM pretest) for students experiencing five class hours of directed instruction weekly.

Also, there was no significant relationship between student achievement level (measured in terms of EPM and PROD) in beginning college typewriting and student characteristics (with or without the EPM and PROD pretest scores) for those students experiencing three or five class hours of directed instruction weekly.

Conclusions

The following conclusions resulted from the findings of the experiment:

1. Beginning college typewriting was taught as effectively with three hours a week in class and out-of-class assignments as with five hours a week in class and all assigments completed in class. This conclusion assumes that a teaching method similar to the one in this study be used whereby homework assignments are required in lieu of the two omitted classes and generous feedback concerning the accuracy of the assignments is available for immediate student reference.

With this beginning college typewriting conclusion, the trilogy has been completed. White concluded that four hours a week proved no better than two among intermediate college typewriting students (see page 23) and Hansen concluded that five meetings a week proved no better than three among advanced college typewriting students (see page 17). Thus, all three levels of college typewriting have been taught effectively with fewer than five hours a week of in-class instruction.

2. The production achievement of students who typed assignments out of class did not differ from the production achievement of students who typed assignments in class.

Both White (see page 22) and Hansen (see page 17) measured production achievement on the college level and found the production achievements of students who typed assignments out of class the same as the production achievements of students who typed assignments in class; therefore, conclusion number two coincided with their results.

3. The straight copy achievement of students who typed assignments out of class did not differ from the straight copy skills of students who typed assignments in class.

This conclusion was consistent with the straight copy achieve-

ment proclamation of Hansen (see page 17); however, White did not measure straight copy achievement.

4. All beginning college typewriting students progressed regardless of the treatment or of their student characteristics.

Researchers who have investigated variable scheduling in typewriting at both the college level and the secondary level (Hansen, Misaling, Yuen, Butler, Rasor, and White) implied that all typewriting students progressed regardless of the treatment (see page 24); yet, none of these investigators dealt with any student variable.

5. A model utilizing student variables of locus of control, cloze reading comprehension, age, typewriter ownership, previous typewriting instruction, and tapping aptitude failed to predict achievement in beginning college typewriting. Achievement was measured in terms of gross words per minute (GWPM) on straight copy, errors per minute (EPM) on straight copy, and production points scored (PROD) on a manuscript, a tabulation and a letter.

Combining these several variables made this study unique, although previous typewriting studies have focused on singular variables with some significant results. West (see page 30) pointed out that the Tapping Test predicted only stroking proficiency on straight copy. However, in this study the Tapping Test did predict achievement for GWPM on straight copy with the pretest but did not predict GWPM achievement on straight copy without the pretest.

6. Predicting GWPM and PROD achievement in beginning college typewriting was best achieved by means of a pretest administered immediately following the introduction of the alphabetic keyboard.

The conclusion about GWPM achievement corresponds to West's belief

that pretest performances revealed individual differences and gave useful indexes of the probable spread of aptitude among typists with regard to stroking rates (see page 32); however, the PROD achievement predictor was not found in a review of the literature. In this study both the GWPM and PROD pretest scores predicted the GWPM and PROD posttest scores at the .001 level of significance.

7. Predicting GWPM and PROD achievement in beginning college typewriting might also have been achieved by means of identifying those students who have had previous typewriting instruction.

This conclusion approaches the belief of West, i.e. the greater the amount of training preceding an initial measure, the more closely that initial measure will correlate with the later measure (see page 32).

8. None of the independent variables identified in this study (locus of control, cloze reading comprehension, age, typewriter ownership, previous typewriting instruction, tapping aptitude, and a pretest) was able to predict EPM achievement.

Similarly, West stated that early errors were useless as a predictor of later accuracy (see page 32).

Recommendations

The recommendations for general implementation are:

1. Beginning college typewriting should be taught on a three-class-hours a week scheduling pattern rather than a five-class hours a week basis, as long as the terminal goals are met (in Appendix C).

2. Beginning college typewriting students should be given competency-based, written, out-of-class assignments to be completed on days when the class does not meet.

3. Out-of-class assignments should be accompanied by generous, immediate, visual feedback.

4. To identify potential low and/or high GWPM and PROD achievers in beginning college typewriting, administer a pretest after the introduction of the alphabetic keyboard.

The recommendations for further study are:

1. Conduct research to compare various meetings per week and some form of individual progression method.

2. Conduct research that would replicate this study.

3. Conduct research to reassess the reliability and validity of the National Business Education Association Typewriting I--First Semester, Number One Test for beginning college students.

4. Conduct research that would focus on and measure the achievement differences of students who have had previous typewriting instruction and those who have not.

Implications

The results of this study led to the following implications:

1. Beginning college typewriting students who are taught on a three-class-hours a week scheduling pattern should be required to complete the out-of-class assignments.

2. Aside from the required out-of-class assignments, students in beginning college typewriting should not be required to practice a specified number of hours a week.

3. Students in beginning college typewriting should be allowed to choose their own place and time for practice and for completing the out-of-class assignments.

4. Out-of-class assignments should be collected and reviewed by the instructor.

5. Authors of beginning college textbooks should consider structuring lesson materials to include alternate lessons that could be given as out-of-class assignments.

6. If more than one section of beginning college typewriting is offered, separate the tyros from those students who have had previous typewriting instruction.

7. If more than one typewriting room is equipped for typewriting instruction and more than one typewriting teacher is available, consider offering multiple sections of beginning college typewriting during the same time slot. This would make possible the separation of the tyros from those students who have had previous typewriting instruction.

8. After the low GWPM and PROD achievers have been identified by way of a pretest administered after the introduction of the alphabetic keyboard, match them with appropriate performance goals and subcompetencies.

9. After the high GWPM and PROD achievers have been identified by way of a pretest administered after the introduction of the alphabetic keyboard, match them with appropriate performance goals and subcompetencies.

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